An experimental analysis of different point specific musculoskeletal pain among selected adolescent-club cricketers in Dhaka City

ABSTRACT

Introduction. Musculoskeletal disorders (MSDs) are considered to be among the most stressful events of human body considering their onset, symptoms and the ultimate consequences.

Aim. This study was conducted to provide a concise overview of cricket-related musculoskeletal pain of the upper limb and lower limb region in male adolescent cricketers.

Material and methods. Data was collected from three clubs in Dhaka city, and the participant’s age group was 10-19 years. Data was collected through oral conversations with participants and physical testing. This process was continued over six months, which repeated monthly between same subjects.

Results. 97 cricketers experienced musculoskeletal pain, where maximum reported upper limb musculoskeletal pain was 33.3% shoulder, 21.6% elbow, 27.5% wrist, and 17.6% hand pain. In contrast, 46 candidates were found in the lower limb musculoskeletal pain category containing 19.6%, 30.4%, 30.4% and 19.6% hip joint, knee joint, ankle joint and foot joint musculoskeletal pain, respectively. BMI had no significant effect on the typical upper and lower limb musculoskeletal pain. Batsmen playing for 4 sessions or more per week are the main victims of upper limb musculoskeletal pain. In contrast, bowlers and all-rounders were the main victims of lower limb musculoskeletal pain under similar workloads.

Conclusion. This study reflects an up-to-date overview of regional upper limb and lower limb musculoskeletal pain where the risk of lower limb injury is most common among all types of players.

Keywords. adolescent cricketer, musculoskeletal pain, upper limb pain, lower limb pain, practice session

The list of abbreviations:

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Introduction
Musculoskeletal disorders (MSDs) are considered to be among the most stressful events of human body considering their onset, symptoms and the ultimate consequences. MSDs are injuries or pain in the human musculoskeletal system, including joints, ligaments, muscles, nerves, tendons and structures that support limbs, neck and back.¹ MSDs are considered highly stressful for the human being enduring it by WHO.² It is reported that evidence of having injuries by playing cricket differs from each other depending on the situation. Obviously, the increased rate of injury of the young crickets is directly proportional to the increased number of playing hours.³ In contrast, statistically, the majority of the adolescent cricketers (~80%) suffering from different extents of MSDs including knee, lower back and shoulder were the three commonly most susceptible anatomical sites of musculoskeletal pain and injuries while, the batsman are the main ultimate victims (~30%).⁴ In all the cases, the coaches and the physiotherapists can play an important role in monitoring incidences of MSDs through positive physical and psychological counselling and early rehabilitation programming.⁵ Musculoskeletal pain (MSP) is a common arising disease condition. The study activity started with the random selection of 110 cricketers and their oral conversation with questioners. This included a blind interview process by the request of participants. The study was conducted from different cricket clubs including - Kolabagan Cricket Academy, Abahoni Club Dhanmondi and Uttara Friends Club Cricket Academy of Dhaka city.

Proper designing of exercise therapy plays a vital role for adolescent cricketers. The design may consist of stretching and strengthening techniques in various joints and it can be active and resistive. Passive stretching helps to increase range of motion (ROM) especially for hip joint which is why clinicians and coaches prescribe passive stretching for improvement of individuals.⁶ To make an effective treatment design for players, appropriate injury records and data collection is also important for reduction, prevention, treatment and rehabilitation.⁷ Reduction and prevention methods are applied before or during game by different kinds of exercises and use of components for support like knee brace, elbow brace, arm band, kinesio tape and others. Pain killers (some injected), stretching, strengthening, sliding, and gliding techniques are applied initially during match and hospitalization if required. Hard and uneven ground can also responsible for sudden severe soft tissue injury.⁸ Rehabilitation programs start after match which is decided on by the discussion of physicians, coaches and the injured players. Effectiveness of postural rehabilitation plays a vital role also in preventing MSP.⁹ Prevention of interference with daily activities is most effective for the treatment of MSP.¹⁰ Scientific studies help to measure common risk factors of adolescent cricketers. Prevention, reduction and preparation for MSP will be a future concern.

Considering all the aforementioned data, our research was conducted for the following objectives such as identification of the prevalence of MSP among adolescent cricketers with their socio-demographic factors, considering their received treatment during training and finally revealing whether there's any correlation between these factors and MSP.

Aim
This study aimed to find out the musculoskeletal pain at various anatomical sites and relationship between musculoskeletal pain and work load among adolescent cricketers.

Material and methods
Participants
The study was conducted on those groups of candidates who had started their yearly training before 1 month and will continue for 5 months without any rehabilitation protocol. Inclusion criteria of participating candidates, who were willing to participate in the study was an age group 10-19 years, a club player, and male adolescent crickets because female candidate were less in number and were not comfortable participating. Data were not taken from participants below 11 years old or above 19 years old avoiding those histories of musculoskeletal pain which lead to physical disability and/or disease condition. The study activity started with the random selection of 110 cricketers and an oral conversation with questioners. This included a blind interview process by the request of participants. The study was conducted from different cricket clubs including - Kolabagan Cricket Academy, Abahoni Club Dhanmondi and Uttara Friends Club Cricket Academy of Dhaka city.

Data processing
The research actively started with the random selection of 110 cricketers and their oral conversation with the given questioners as followed by physical testing, inspection (symmetry, swelling, muscle atrophy), palpation (warmth, tenderness, trigger points) and joint range of motion by the passive, active and resisted movement of flexion, extension, abduction, addition
internal rotation and external rotation. Some special
tests performed when collecting data were the empty
can and drop arm test, external rotation lag sign, bel-
ly press and lift off test for t shoulder joint assessment,
Cozen's test, golfer's elbow test, hook test,13 Finkelstein's
test, Tinel's sign, Murphy sign for the upper limb physical
assessment, FABER (Patrick's) test, Trendelenburg
sign, AB-HEER test, the prone instability test, HEER
test, anterior drawer test and posterior drawer test, pa-
tellar grind test, Varus stress test and Valgus stress test
for the lower limb physical assessment and neuro-dy-
namic test.14-26 Musculoskeletal pain assessed by num-
eric pain rating scale where the intensity of pain was
defined as mild, moderate and severe.27

Data analysis
After collection of data, all interview questionnaires
were checked for completeness correctness and inter-
nal consistency to exclude missing or inconsistent data.
Corrected data was entered into a computer. The data
was analyzed by using SPSS (Statistical Package for
Social Science) version 22 and Graph Pad Prism (version
5.0, Graph Pad Software, San Diego, CA, USA). Prior to
data collection, permission from the ethical committee
of the State College of Health Sciences was taken.

Results
Among the 110 participants, approximately 16.4%
(n=18) were among the age group 10-15 and 83.6%
(n=92) were among the age group 16-19. Among them,
the second group has the highest mean age (16.94±1.191
years). Between them, more than half (54.5%, n=60) of
the players were all-rounder, 26.4% (n=29) of the play-
ers were batsman, and 19.1% (n=21) of the players were
bowlers according to the specialty of playing match.
Among them, the All-rounder had the highest percent-
age and the lowest percentage was bowler. On the other
hand, 23.6% (n=26) were left hand batsman and 76.4%
(n=84) were right hand batsman and 22.7% (n=25) were
left hand bowlers and approximately 77.3% (n=85) were
right hand bowlers.

In the research, 51 candidate cricketers showed up-
per limb musculoskeletal pain (UL-MSP) with 33.3%
shoulder joint pain, 21.6% elbow joint pain, 27.5% wrist
joint pain, 17.6% hand joint pain. In contrast, 46 can-
didates were found in lower limb musculoskeletal pain
(LL-MSP) category containing 19.6%, 30.4% and 19.6%
hip joint, knee joint, ankle joint and foot joint
MSP, respectively (Table 1). We found p value as chi-
square test of R1,R2,R3,R4 and R5 in UL-MSP respec-
tively 0.410, 0.725, 0.435, 0.263 and 0.166 on the other
hand LL-MSP 0.537, 0.471, 0.359, 0.471 and 0.687, re-
spectively (Table 1). According to numeric pain rat-
ing scale this research shows, Replication 1 showed
UL-MSP with 31.4% (n=16) mild pain, 47.1% (n=24)
moderate pain, 21.6% (n=11) severe pain. In con-
trast, LL-MSP containing 26.1% (n=12), 58.7% (n=27)
and 15.2% (n=7) mild, moderate and severe pain,
respectively. Replication 2 showed UL-MSP with 27.5%
(n=14) mild pain, 54.9% (n=28) moderate pain, 17.6%
(n=9) severe pain. In contrast, LL-MSP containing
19.6% (n=9), 65.2% (n=30) and 15.2% (n=7) mild,
moderate and severe pain, respectively. Replication 3 showed
UL-MSP with 35.3% (n=18) mild pain, 39.2% (n=20)
moderate pain, 25.5% (n=13) severe pain. In con-
trast, LL-MSP containing 30.4% (n=14), 47.8% (n=22)
and 21.7% (n=10) mild, moderate and severe pain,
respectively. Replication 4 showed UL-MSP with 35.3%
(n=18) mild pain, 47.1% (n=24) moderate pain, 17.6%
(n=9) severe pain. In contrast, LL-MSP containing
30.4% (n=14), 60.9% (n=28) and 8.7% (n=4) mild,
moderate and severe pain, respectively. Replication 5 showed
UL-MSP with 27.5% (n=14) mild pain, 51.0% (n=26)
moderate pain, 21.6% (n=11) severe pain. In contrast,
LL-MSP containing 26.1% (n=12), 63.0% (n=29) and
10.9% (n=5) mild, moderate and severe pain, respec-

Table 1. Male Cricketers of different groups suffering from locus specific MSP

<table>
<thead>
<tr>
<th>Replication of subjective data assessment</th>
<th>Locus of musculoskeletal pain (MSP)</th>
<th>Upper limb (UL)</th>
<th>Lower limb (LL)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>*N= 51</td>
<td>*N=46</td>
<td></td>
</tr>
<tr>
<td></td>
<td>p Value</td>
<td>Shoulder joint</td>
<td>Elbow joint</td>
</tr>
<tr>
<td>R1</td>
<td>0.410</td>
<td>17</td>
<td>11</td>
</tr>
<tr>
<td>R2</td>
<td>0.725</td>
<td>16</td>
<td>11</td>
</tr>
<tr>
<td>R3</td>
<td>0.435</td>
<td>17</td>
<td>10</td>
</tr>
<tr>
<td>R4</td>
<td>0.263</td>
<td>18</td>
<td>12</td>
</tr>
<tr>
<td>R5</td>
<td>0.166</td>
<td>17</td>
<td>11</td>
</tr>
<tr>
<td>Average (%)</td>
<td>33.30</td>
<td>21.60</td>
<td>27.50</td>
</tr>
</tbody>
</table>

* N refers the number of candidates in all categories; R is for the replication/rounds of data collection and assessments from different player groups
** p value marked as chi-square test which indicated that there is no significant relationship between UL-MSP and LL-MSP.
tively. 13 cricketers were observed to be safe from all types of MSP in our research. The intensity of pain experienced by candidates was 27.2% mild, 53.2% moderate and 17.7% severe. 13 cricketers were observed to be safe from all types of MSP in our research.

In the research, 51 candidates showed UL-MSP with 15.7% (n=8) underweight and 84.3% (n=43) normal weight of BMI. In contrast, LL-MSP containing 19.6% (n=9) and 80.4% (n=37) underweight and normal weight, respectively (Figure 1). On the other hand, 23.1% (n=3) underweight and 76.9% (n=10) normal weight of BMI who has not found MSP.

In this study, 51 cricketers who were in UL-MSP, out of them 11 batsman played respectively (n=3) 2 hour per session (H/S), (n=3) 3 H/S and (n=4) 5 H/S between 3 session per week (S/W) also 4 batsman played (n=2) 2 H/S and (n=2) 5 H/S between 5 S/W (Figure 2a), 13 bowler played (n=8) 3 H/S, (n=3) 5 H/S between 3 S/W and (n=1) 2 H/S, (n=1) 3 H/S between 5 S/W (Figure 2b) and 24 all-rounder played (n=3) 2 H/S, (n=3) 3 H/S, (n=2) 5 H/S between 3 S/W on the other hand (n=5) 2 H/S, (n=5) 3 H/S and (n=6) 5 H/S between 5 S/W (Figure 2c). 46 cricketers who were in LL-MSP out of them 10 batsman played respectively (n=2) 2 H/S, (n=2) 3 H/S and (n=1) 5 H/S between 3 S/W also (n=1) 2H/S and (n=4) 5 H/S between 5 S/W(Figure 2d), 13 bowler played (n=1) 2 H/S, (n=7) 3 H/S and (n=4) 5 H/S between 3 S/W also (n=1) cricketer played 2 H/S between 5 S/W (Figure 2e) and 23 all-rounder played (n=4) 2 H/S, (n=2) 3 H/S, (n=4) 5 H/S between 3 S/W also (n=3) 2 H/S, (n=4) 3 H/S and (n=6) 5 H/S between 5 S/W (Figure 2f), 13 cricketers who has no MSP out of them 7 batsman played (n=4) 2 H/S and (n=3) 3 H/S between 3 S/W also 1 bowler played (n=1) 2 H/S between 3 S/W and 5 all-rounder played (n=4) 2 H/S, (n=1) 3 H/S between 3 S/W.

Batsmen playing for 4 sessions or more per week were the main victims of UL-MSP, below 4 sessions

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Fig. 1. Comparative analysis of the variance of BMI level between the UL-MSP (*) and LL-MSP (**) player groups

Fig. 2. Comparative analysis of upper limb and lower limb musculoskeletal pain between batsman, bowlers and all-rounders based on sessions and hours, S/W - session per week, H/S - hour per session
LL-MSP (Figure 2a; 2d) in our research. The bowlers performing 4 or more sessions per week are suffering from LL-MSP compared to the upper limb group (2b; 2e). Furthermore, the all-rounders playing more than 4 sessions have UL-MSP as compared to the all-rounders playing below 4 sessions per week (Figure 2c, 2f).

Discussion
In this research, 51 candidate cricketers showed upper limb musculoskeletal pain with 33.3% shoulder joint pain, 21.6% elbow joint pain, 27.5% wrist joint pain, 17.6% hand joints pain. In contrast, 46 candidates were found in lower limb musculoskeletal pain category containing 19.6%, 30.4%, 30.4% and 19.6% hip joint, knee joint, ankle joint and foot joint MSP, respectively (Table 1). That situation directly reflects the findings of Noorbhai.4 Additionally, Saayman mentioned the front foot hip joint pain and lower back pain (LBP) of the fast bowlers which are highly concerning to the final team combination selection.29 Ranges of treatment options have been implemented on the basis of injury level and players response to the injury. Few have suggested by Rao especially to sufferer from foot and ankle pain.29

Gregory stated that the fast bowlers experienced higher frequency of injury than the spin bowlers, where, the sustainability of injury was 8.6%, 11.4% and 2.3% higher.33 In contrast, the spin bowlers were at ~7% higher risk of shoulder injury. High prevalence of moderate pain noticed in our study which is directly reflects the findings of Noorbhai.4 13 cricketers were observed to be safe from all types of MSP in our research.

BMI has found no significant effect on the typical upper and lower limb musculoskeletal pain formation (Figure 1) in the research which is directly similar with the findings of Das.31 But Talupuru showed the evidence of BMI effect on overall batting performance for gripping with more come-back-chances who have less than 25 BMI.32 For the adolescent players, BMI plays important role in their performance and sporting attitude.

Considering age and health condition like pain in lower limbs including knees and hips, BMI is considered as one of the main reasons of injury by Stovitz.34 Age and BMI explained only 1.9% of the variance in pain generation of individuals as reported by Wright.35 Which directly opposite to the aforementioned ideas of Stovitz,34 Which is directly similar to our findings (Figure 1).

Orchard, Drew and many others report that workload is mainly responsible for musculoskeletal injury of adolescent cricketers which is directly similar to our findings.36-38 In this study, mainly all-rounders are main victim of MSP rather then bowlers. These findings are dissimilar with a previous study on adolescent cricketers in KwaZulu-Natal, where injuries to all-rounders 28% and batsman 30% mentioned by Noorbhai.4 On the other hand, Sathya and Parekh stated that all-rounders received maximum injuries of 70% and bowlers 60% which directly reflects our study.39 Batsmen playing for 4 sessions or more per week are the main victims of UL-MSP which agrees with Hulin.40 While, below 4 sessions are of LL-MSP (Figure 2a; 2d) in our research. Most of the adolescent participants usually suffer from LL-MSP over that of their UL-MSP conditions on a usual basis according to Garbenyté-Apolinskienė.41 The bowlers performing 4 or more sessions per week are suffering from LL-MSP more than that of the upper limb group (2b; 2e). Furthermore, the all-rounders playing more than 4 sessions have UL-MSP as compared to the all-rounders playing below 4 sessions per week (Figure 2c, 2f).

Shoulder pain has become very acute in that case when the participants fall into the category of 10 to 19 years or from the little league of sports observed by Drew.42 Things are quite different for the healthy adult players of either professional or non-professional cases mentioned by Dannecker and Koltyn.43

Conclusion
This study represents that male adolescent cricket players residing in Dhaka city have high prevalence of musculoskeletal pain. A more concise overview reflects the regional upper limb and lower limb musculoskeletal pain where the risk of upper limb injury is most common between all types of players. Shoulder joint and wrist joint from upper limb region relatively knee and ankle joint was mainly affected to musculoskeletal injury. This study also noticed a strong impact between musculoskeletal pain and workload. Mainly all-rounders followed by bowlers are main victims of lower limb musculoskeletal pain and batsman are the main victims of upper limb musculoskeletal pain due to workload. Parents, guardians and coaches should pay specific caution to reduce exacerbating factors causing musculoskeletal pain and also pay strong attention for the rehabilitation protocol.

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References


